

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Nyberg et al.)
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Application No.: 10/796,424) Art Unit: 1793
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Filed: 3/8/2004) Examiner: Ngoclan Thi Mai
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Title: Feedstock Composition and Method) Confirmation No: 1793
of Using Same for Powder Metallurgy) Attorney Docket No: 14185-B
Forming of Reactive Metals)
)

DECLARATION OF KEVIN L. SIMMONS UNDER 37 CFR §1.132

My name is Kevin L. Simmons. I make the following declaration of my own personal knowledge:

1. I am a researcher at the Pacific Northwest National Laboratory and am a named inventor on the aforementioned patent application.
2. I have eighteen years of experience in polymer and composite material processing.
3. I have reviewed USP# 3,330,892 (Hermann), EP 456441 A1 (Chung), USP# 3,302,073 (Broodo), and JP06-002011, which have been cited by the examiner. These references are significantly different from the present invention. I have also reviewed the examiner's rejections based on these references and respectfully disagree.
4. The particular use of relatively small amounts of ethylene vinyl acetate (EVA) and/or polyethylene (PE) is significant in the claimed invention and, therefore, EVA and PE can not be substituted with just any other polymer while retaining the benefits of the claimed invention. This was not obvious to me prior to the invention.

5. One characteristic that makes EVA and PE significant to the claimed invention is their immiscibility in the aromatic binders of the claimed composition.
6. Polymethyl methacrylate and polyvinyl acetate, which are cited by the examiner are much more miscible than EVA and PE in the aromatic binders of the claimed invention.
7. The use of the immiscible EVA and/or PE polymers unexpectedly resulted in the ability to significantly reduce the amount of polymeric constituent in the binder without a comparable loss in green body strength. This is important because while the aromatic binder constituent can be removed by sublimation, the polymeric constituent must be removed by thermal decomposition.
8. Thermal decomposition has a high potential of leaving behind residual carbon in the final sintered part, which is deleterious to the mechanical properties. Therefore it is important and beneficial to minimize the amount of polymer in the feedstock composition.
9. Furthermore, thermal gravimetric analysis (TGA) data for EVA compared to TGA data from other polymers (see attached figures comparing EVA and polystyrene) suggests that simple substitution of one polymer for another in the feedstock composition is not feasible and/or appropriate.
10. The TGA curve of EVA exhibits a "step" that is most likely attributed to cross linking of the EVA as the temperature increases during burnout. When the EVA cross links, the rate of weight loss decreases because the polymers become "more strongly" bound. When applied to the feedstock composition, the behavior of EVA can mean that green/brown strength can be higher through burnout/anneal steps relative to feedstocks using other polymers.
11. Not all polymers exhibit the cross-linking behavior that we believe occurs in the present invention and that provides the advantages of our invention.

Accordingly, the polymers claimed in the present application are distinct from those of the cited references.

12. The cited references do not teach the particular composition claimed in the present application. Neither is it obvious to substitute the constituents in our claimed invention with the constituents taught by the cited references. Therefore, I respectfully disagree with the examiner's rejections.
13. All of the statements made herein from personal knowledge are true and correct statements made by the indicated person, and all statements made on information and belief are believed to be true. The undersigned acknowledges that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Dated this 5th day of October, 2009.



Kevin L. Simmons (Inventor)